

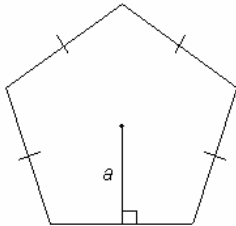
Area of Regular Polygons

Objectives

- Find the area of regular polygons
- Find the area of circles

Notes

In a regular polygon, a segment drawn from the center of the polygon perpendicular to a side of the polygon is called an **apothem**.



Area of a Regular Polygon

For area A and perimeter P , and apothem a ,

$$A = \frac{1}{2} Pa$$

Area of a Circle

For area A and radius r ,

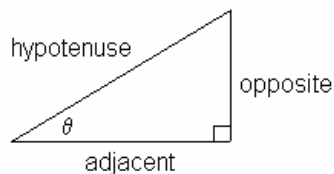
$$A = \pi r^2$$

Helpful Trig Functions

$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

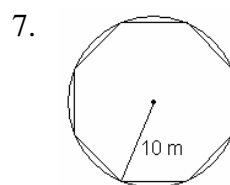
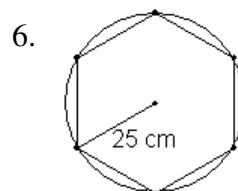
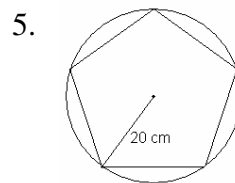
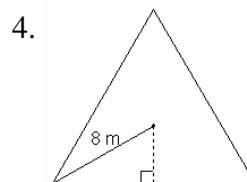
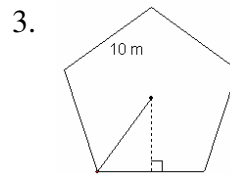
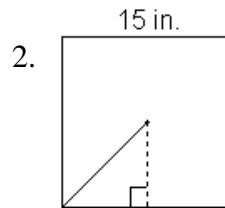
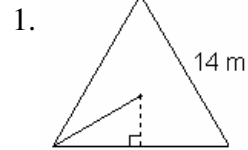
$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$



Examples

Find the apothem, area, and perimeter of each regular polygon. Round your answers to the nearest tenth.



Homework

Area of Regular Polygons

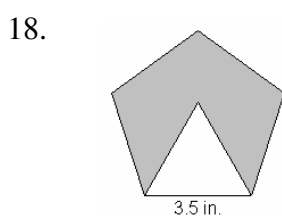
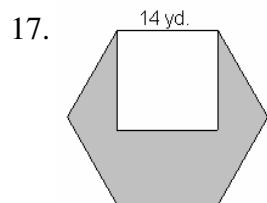
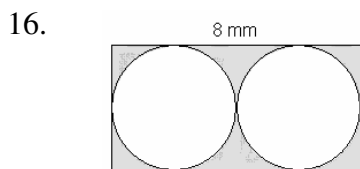
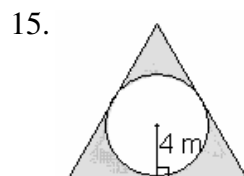
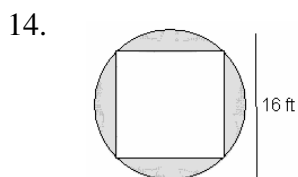
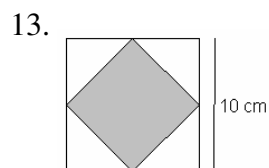
Find the area of each regular polygon. Round your answers to the nearest tenth.

1. Square with apothem length of 12 centimeters.
2. Triangle with side length of 15.5 inches.
3. Square with perimeter of $84\sqrt{2}$ meters.
4. Hexagon with perimeter of 60 feet.
5. Octagon with side length of 10 kilometers.
6. Hexagon with apothem length of 24 inches.

Find the circumference and area of circles with the given radius.

- | | |
|-------------------------|---------------------------------|
| 7. 34 meters | 8. 8.5 centimeters |
| 9. 15 millimeters | 10. 10.25 inches |
| 11. $5\frac{1}{3}$ feet | 12. $21\frac{3}{4}$ centimeters |

Find the area of each shaded region. Assume that all polygons are regular. Round your answers to the nearest tenth.



Factor each trinomial.

- | | |
|---------------------|---------------------|
| 19. $x^2 + 3x - 54$ | 20. $x^2 - 7x - 30$ |
|---------------------|---------------------|

Examples

Find the area of each regular polygon. Round your answers to the nearest tenth.

8. An octagon with an apothem 4.8 centimeters long and a side 4 centimeters long.

9. A square with a side 24 centimeters long and an apothem 12 inches long.

10. A hexagon with a side 23.1 meters long and an apothem 20.0 meters long.

11. A pentagon with an apothem 316.6 millimeters long and a side 460 millimeters long.

12. A hexagon with an apothem of $5\sqrt{3}$ cm.

13. A pentagon with a perimeter of 54.49 meters and an apothem of 7.5 meters.

Find the area of each shaded region. Assume that all polygons are regular. Round your answers to the nearest tenth.

